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# GROWTH OF THIN FULLERENE FILMS BY MATRIX ASSISTED PULSED LASER EVAPORATION

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Metal and metal oxide films with controlled thickness from a fraction of a monolayer up more than 1000 nm and known stoichiometry can be produced by pulsed laser deposition (PLD) relatively easily, and (PLD) is now a standard technique in all major research laboratories within materials science. However, organic materials are usually not well suited for direct laser irradiation, since the organic molecules may suffer from fragmentation by the laser light. We have, therefore, explored the possible fragmentation of organic molecules by attempting to produce thin films of $C_{60}$ which is a strongly bound carbon molecule with a well-defined mass (M = 720 amu) and therefore a good, organic test molecule.
$C_{60}$ fullerene thin films of average thickness of more than 100 nm was produced in vacuum by matrix-assisted pulsed laser evaporation (MAPLE). A 355 nm Nd:YAG laser was directed onto a frozen target of the matrix material, anisole, with a concentration of 0.67 wt% $C_{60}$. At laser fluences below 1.5 J/cm$^2$, a dominant fraction of the film molecules are $C_{60}$ transferred to the substrate without any fragmentation. High-resolution SEM images of MAPLE deposited films reveal large circular features on the surface with high amount of material concentrated at edges. These features, observed over a wide range of laser fluences, are caused by ejection of large matrix-fullerene liquid droplets into the gas-phase and subsequent deposition. At similar laser energies, but using an unfocused laser beam, MAPLE favours evaporation of matrix and organic molecules, resulting in production of films with smooth surfaces and minimal contamination.